RCV
Research Control® | ReCo® Valves

Process Control Valves

Model 9100

Badger Meter

RCV-UM-00588-EN-02 (August 2015)

User Manual

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SCOPE OF THIS MANUAL

This manual explains how to install and operate the Model 9100 Control valve.

Read this manual carefully before attempting any installation or operation. Keep the manual accessible for future reference.

UNPACKING AND INSPECTION

Upon opening the shipping container, visually inspect the product and applicable accessories for any physical damage such as scratches, loose or broken parts, or any other sign of damage that may have occurred during shipment.

NOTE: If damage is found, request an inspection by the carrier's agent within 48 hours of delivery and file a claim with the carrier. A claim for equipment damage in transit is the sole responsibility of the purchaser.

SAFETY

The installation of the valve must comply with all applicable federal, state, and local rules, regulations, and codes.

⚠CAUTION

- ***Follow your company's safety rules concerning equipment installation or repairs.***
- ***Read the user manual and brochure before attempting repairs.***
- ***Never use this or any valve in an application that is above the limits of the unit.***
- ***Never use the valve above the pressure/temperature rating listed in the brochure.***
- ***Never use the valve in applications that attack bronze materials.***
- ***De-pressurize the system before disassembling the valve.***
- ***Never rotate the innervalve when in the closed position.***
- ***Rotation of metal on metal components causes galling and will affect the function and shutoff capability of the unit.***

⚠CAUTION

ON ACTUATORS WITH TWO (2) LONG ACTUATOR BOLTS, THE SPRINGS ARE UNDER TENSION EVEN WHEN ACTUATOR IS OFF THE VALVE.

⚠CAUTION

WHEN DISASSEMBLING ACTUATOR, REMOVE LONG NUTS LAST TO RELIEVE SPRING COMPRESSION.

⚠CAUTION

DO NOT ROTATE THE ACTUATOR STEM. USE A BACKUP WRENCH TO KEEP STEM FIXED DURING CONNECTION OF THE INNERVALVE TO THE STEM. ROTATION OF THE STEM WILL CAUSE THE SPRINGS TO SHIFT, WHICH WILL CAUSE THE ACTUATOR TO MALFUNCTION.

⚠CAUTION

- ***Never use the actuator as a lever to tighten the valve body onto a pipe or fitting.***
- ***Never clamp the body in a vice on the sides of the body. Always clamp end-to-end.***
- ***Replace any damaged components. It's less expensive than a shut-down.***
- ***Remove the actuator before disassembling the valve sub-assembly.***

⚠CAUTION

EVEN THOUGH THE MODEL 9100 IS A RUGGED VALVE, IF THE UNIT WILL BE INSTALLED IN A HIGH VIBRATION SITUATION, THE ACTUATOR SHOULD BE BRACED. AN ANGLE BRACKET KIT [FITTING THE ACTUATOR RIM SCREWS] IS AVAILABLE FOR THIS PURPOSE. THE BRACKET CAN ALSO BE USED TO MOUNT ACCESSORIES TO THE ACTUATOR.

DESCRIPTION

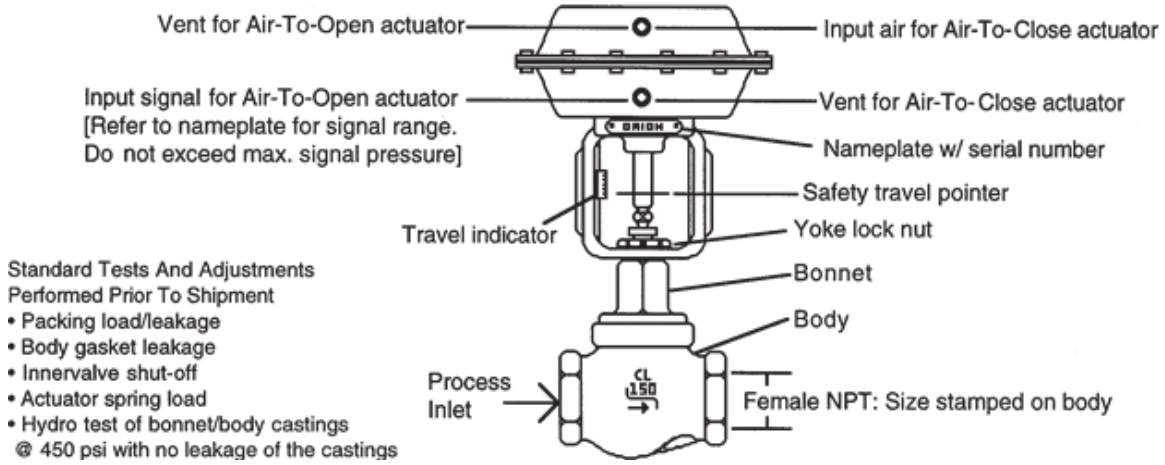


Figure 1: Part identification

INSTALLATION

1. Remove protective plugs from body and air signal connection.

NOTE: Leave vent in place.

2. Install valve in pipeline using PTFE tape or other suitable pipe thread sealant.

⚠CAUTION

USE HEX ON BODY TO TIGHTEN PIPE INTO BODY. NEVER USE THE ACTUATOR AS A LEVER.

3. Install a suitable 1/4" NPT fitting in the air signal connection using TFE tape or other sealant.

Re-Orienting the Actuator

⚠CAUTION

IF THE AIR CONNECTIONS IN THE ACTUATOR NEED TO BE RE-ORIENTED, DO NOT SIMPLY TURN THE ACTUATOR. IF THE UNIT IS AIR-TO-OPEN (ATO) THE FORCE ON THE INNERVALVE FROM THE CLOSURE SPRINGS WILL DAMAGE THE INNERVALVE.

If you must re-orient the actuator:

1. Apply an air signal to the actuator to raise the innervalve off the seat (approximately mid travel).
2. Loosen the yoke locknut.
3. Re-orient the actuator.
4. Tighten the yoke locknut and THEN release the air signal pressure. To accomplish this, there is no reason to loosen either the bonnet joint or the connection between the innervalve stem and actuator stem.

If the unit comes equipped with a positioner or other devices, refer to the instructions accompanying the accessory.

Installation Considerations

- Although the actuator can handle higher pressures, Do Not exceed the signal range stamped on the nameplate. If a positioner is used, there is normally no need to use more than 40 psi of supply air unless the unit will not achieve full travel.
- Do not use TFE tape to pipe positioners. Small shreds of Teflon® can cause malfunction of the positioner.
- Do not repeatedly remove air from the actuator when an ATO valve is open. Slamming the innervalve shut when dry can cause galling of the innervalve.

OPERATION

The Model 9100 is a modulating control valve. It is normally supplied with a 35 sq. in. pneumatic multi-spring opposed diaphragm actuator in either Air-To-Open (ATO) or Air-To-Close (ATC) action.

The actuator spring loading of your valve has been pre-adjusted. If your size 35 actuator is an Air-To-Open version and the signal range stamped on the nameplate is **3-15**, the unit is equipped with 3 force springs and should achieve full travel with approximately 12 psi of signal change. Since the "bench setting" is done with no upstream pressure, a 3-15 range unit is normally set to open at 3.25…3.5 psi. This provides a minimum of "closing" force to shut off the innervalve under minimal upstream pressures, depending on innervalve size and upstream pressure. If your valve does not close against the upstream pressure, the springs can be adjusted (to shut off up to the maximum levels indicated in the general brochure.)

If your valve has 6 force springs and no positioner, it will be stamped **3-27** or **6-30**, indicating a 24 psi span. If your valve is an Air-To-Close version, it will be set so the innervalve touches the seat at approximately 14.5 psi.

Several factors determine a valves ability to close off with an acceptable degree of tightness. Three significant factors are:

- Upstream pressure
- Orifice diameter
- Actuator spring loading, in the case of an Air-To-Open valve. In the case of an Air-To-Close valve, maximum output air pressure working against the innervalve and springs, determine shutoff tightness.

If the upstream pressure (P1) is multiplied by the innervalve orifice area, the upward force, in "pounds of linear force" acting on the valve stem is determined. If that is divided by the effective area of the actuator, the minimum bench setting is known. Normally 1/4 to 1 psi extra is required to achieve shutoff, depending on orifice diameter, seat tightness desired and the seat/innervalve material.

For example:

P1 = 100 psi

Orifice area= 0.7854

Actuator area= 35 in. ^{2}

Calculation: 100 x 0.7854 = 78.54 lb of upward force ÷ 35 in. ^{2} = 2.25 psi air.

This means that the spring loading needs to be adjusted so that if a 3…15 psi signal is nominal, we add 2.75 (1/2 psi extra) to the minimum signal pressure (3), we know that when the controller output is 3 psi, we have the 2.75 psi extra loading to close the valve. Without upstream pressure, the valve would require 3+2.75 = 5.75 psi of air to lift the innervalve off the seat. With 100 psi of upstream pressure, the valve should lift off the seat at approximately. 3 psi.

If you need assistance in performing this calculation, feel free to contact Technical Support for assistance.

ADJUSTING ACTUATOR SPRING LOADING

(Not applicable for spring ranges 6…15, 9…15 and 10…15 psi.)

In the Air-To-Open configuration, the seating force of the actuator springs can be adjusted to provide sufficient load to shut off the innervalve. If the unit is not closing completely when the minimum signal is sent to the actuator, the spring force needs to be increased, based on the calculation above (best done on workbench).

To increase the seating force:

1. Pipe a manual air regulator (with output gauge) to the air connection in the lower actuator housing. The regulator should be capable of controlling pressure over the range indicated on the nameplate.
2. Using the regulator, raise and lower the air pressure to determine where the valve "seats". It the seating load needs to be increased, stroke the valve to about 1/2 travel.
3. Place a 1/2 in. open-end wrench on the lower stem nut.
4. With another 1/2 in. wrench, loosen the upper nut and turn counterclockwise about 1/4 turn.
5. Lower the air pressure to determine the signal pressure now needed to "seat" the valve. Using the stem as the adjustor, keep threading the stem in or out as desired until the proper seating position is achieved.
6. When the proper loading is reached, place a wrench on the flats machined on the actuator stem and tighten the upper nut against the actuator stem.
7. Place a wrench on the upper nut and lock the lower nut to the upper nut.

The unit is now ready for operation.

⚠CAUTION

NEVER TURN THE NUTS OR INNERVALVE STEM WHILE THE VALVE IS SEATED. THIS WILL RESULT IN INNERVALVE DAMAGE AND PREVENT THE INNERVALVE FROM SEATING PROPERLY.

In the Air-To-Close configuration, the same procedure is used. However, the action of the unit is in reverse. Adjustments are made while checking the seating position with increasing air signal pressure.

Typically, an ATC actuator should be set to seat the innervalve at about 1/4…1/2 psi prior to maximum signal pressure.

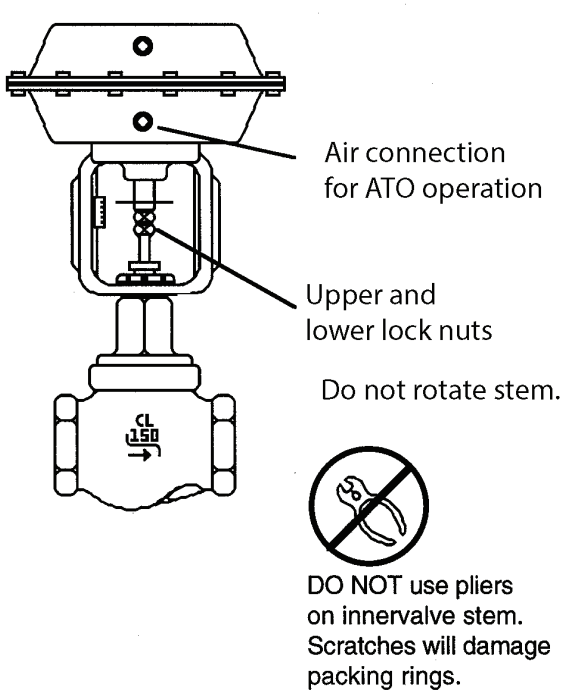
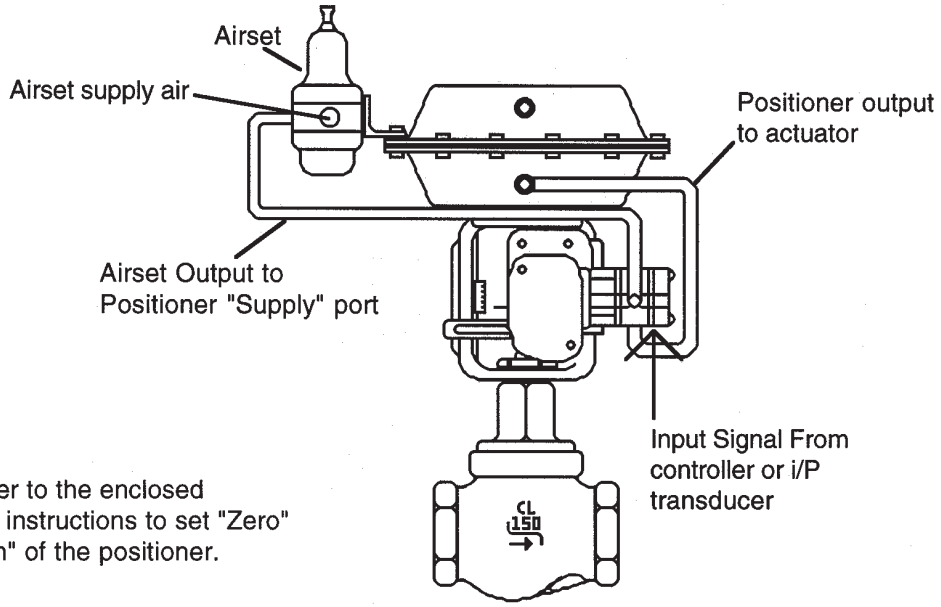


Figure 2: Adjusting spring loading

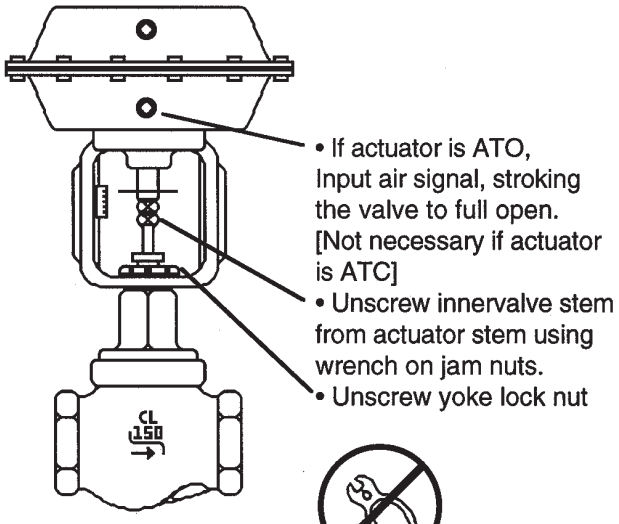
SCHEMATIC OF ATO VALVE WITH STANDARD MOORE 750 POSITIONER AND AIRSET (PIPED)

NOTE: Actual piping may look different than shown.



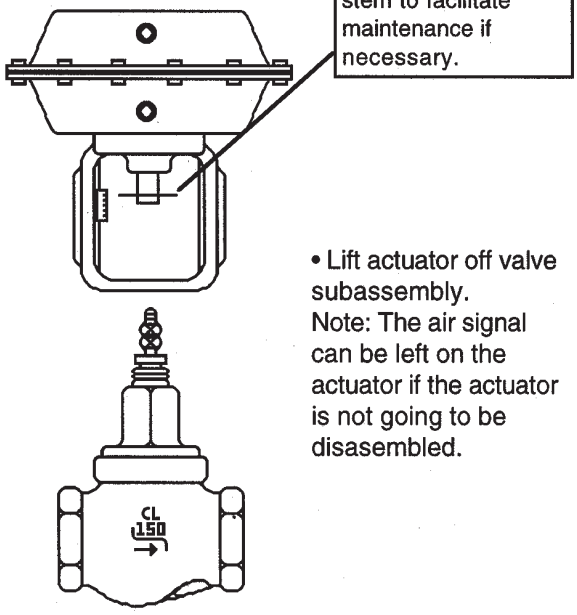
Note: Refer to the enclosed positioner instructions to set "Zero" and "Span" of the positioner.

Removing the Actuator from the Valve Subassembly



- If actuator is ATO, Input air signal, stroking the valve to full open. [Not necessary if actuator is ATC]
- Unscrew innervalve stem from actuator stem using wrench on jam nuts.
- Unscrew yoke lock nut

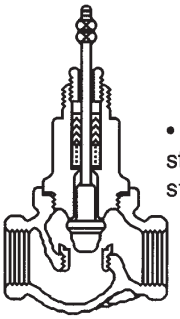
DO NOT use pliers on innervalve stem. Scratches will damage packing rings.


The safety nylon pointer disc can be "popped" out of it's groove and slid up the stem to facilitate maintenance if necessary.
CL 150

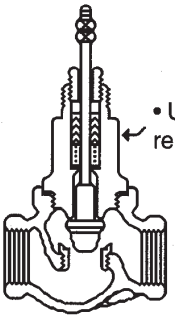
- Lift actuator off valve subassembly.

Note: The air signal can be left on the actuator if the actuator is not going to be disasembled.

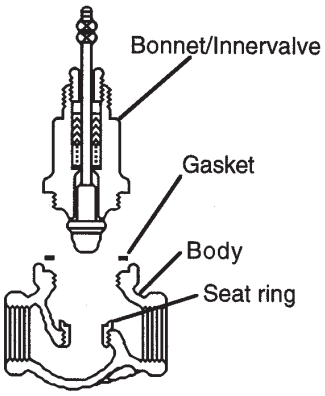
Disassembling the Valve Subassembly

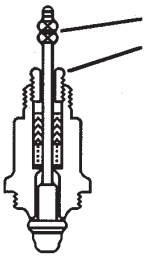


• Pull innervalve stem up until it stops.

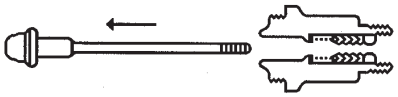


• Unscrew and remove bonnet



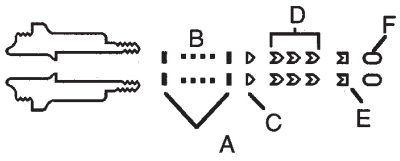


• Remove jam nuts.
• Remove packing gland

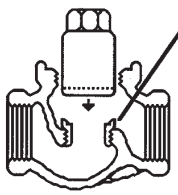


• Pull innervalve out bottom of bonnet

Remove stuffing box components. Normally the parts shown can be forced out the top of the bonnet by pushing the components out with a plastic or wooden rod [3/8"ø] through the bottom of the bonnet.

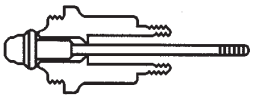


A: SST Flat washers
B: SST Spring
C: Lower TFE adapter
D: 3 chevron rings
E: Upper adapter
F: Follower



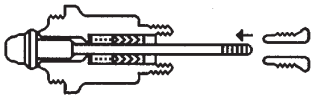
• Using special tool or flat plate, remove seat ring.

Re-Assembling the Valve Subassembly

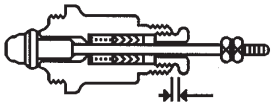


• Insert new innervalve into empty bonnet

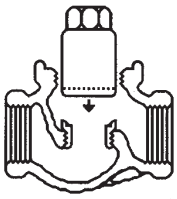
• Install stuffing box components [in the order shown] over stem. Be careful when sliding the packing rings over the stem threads.
Lubricate [w/ silicone grease] all TFE parts and threads.



• Install packing gland.
Tighten finger tight.

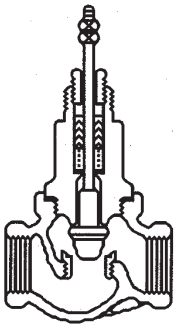


• Install 2 jam nuts onto stem [bottom of threads] and lock together with wrenches.
• Tighten packing gland until there is a 0.04"-05" [1-1.5 mm], or about the thickness of a quarter, gap between the bottom of the gland hex and the top of the bonnet.
Note: If packing leakage occurs, the gland can be tightened [down all the way if necessary] to the bonnet without damaging the packing.



• Install new seat ring.
Use lubricant on threads and seat chamfer.

Torque to:
3/4" and 1" valves: 50-60 ft/lbs
1-1/4 and 1-1/2" valves: 100-110 ft/lbs.
2" valves: 150-160 ft/lbs



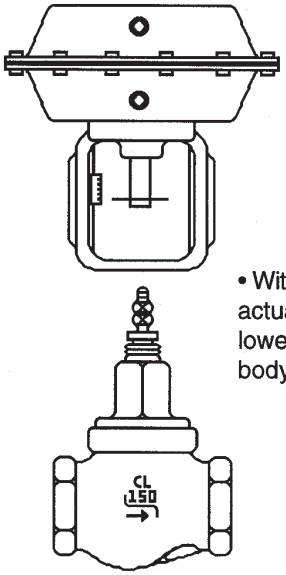
• Install new gasket and thread bonnet into body. Use lubricant on gasket and bonnet threads.

⚠CAUTION

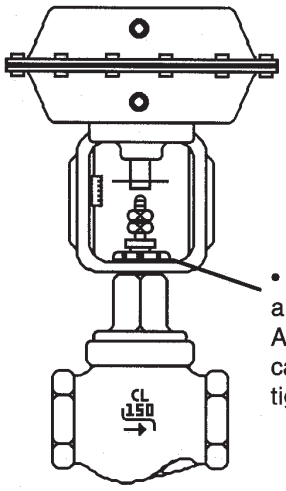
Caution: To preclude galling innervalve onto seat, pull stem up until it stops before threading bonnet into body.

Bonnet Torque: Normal Applications
3/4" and 1" valves: 200-225 ft.lbs.
1-1/4 to 2" valves: 450-475 ft.lbs.

Bonnet Torque: High Vibration Areas
3/4" and 1" valves: 300-350 ft.lbs.
1-1/4 to 2" valves: 650-700 ft.lbs.



• With air still on actuator, [if ATO] lower actuator onto body assembly.

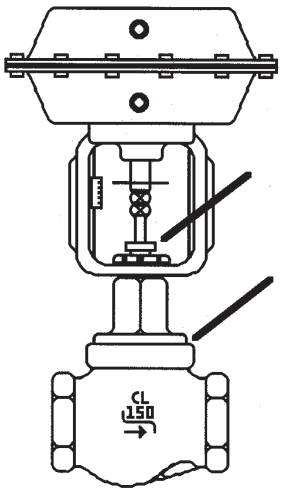


• Install yoke lock nut and tighten.
A hammer and punch can be used to tighten nut.

• Thread innervalve stem into actuator stem.
The bench setting can be adjusted [Ignore if using fixed rate springs such as 6-15, 9-15 or 10-15 range] at this point by varying the amount of innervalve stem threads engaged into the actuator stem. Once the proper amount is achieved, [Not to exceed 4 psi on 3-Spring unit or 8 psi on 6-Spring unit], UNLOCK the two stem nuts and lock the upper nut against the actuator stem. Then lock the bottom nut against the upper nut.

⚠CAUTION

DO NOT rotate the actuator stem. Use a back-up wrench to hold the stem firmly in place during connection tightening.



• Using the input signal, stroke the valve to check function.
• Place the nylon travel pointer disc back in the "V" groove of the stem.
• Adjust the travel scale so that the disc points to the bottom mark when the valve is closed.
• Check for external leakage at the points indicated using 50-100 psig air and a soap/water solution.
If there is leakage in the stem/packing area, tighten the gland 1/2 turn and recheck.
• If desired, seat leakage can be checked using 20-30 psi air at the inlet of the valve [with 0 pressure in the actuator on ATO units or 15 psi air in the actuator on ATC units.

The valve is now ready to be re-installed into the pipeline.

Please provide valve serial number when calling the factory with questions.

ENGINEERING DRAWINGS

DWG NO.	ISSUE	ISS	CHANGE	BY	DATE	UNLESS OTHERWISE SPECIFIED DIMENSIONS FOR REFERENCE ONLY LENGTH UNITS ARE INCHES	ALL PROPRIETARY RIGHTS IN THE SUBJECT MATTER SHOWN ON THIS DRAWING ARE THE EXCLUSIVE PROPERTY OF BADGER METER INCORPORATED.
CD-952006	01.03	01.02	ECN 8882	GAP	09-05-96		
		01.03	ECN 9160 EM 2001	DGD	06-21-00		

NOTES:

1.) TRIM ASSEMBLY P/N
Cv: CHAR:

2.) NOMINAL STROKE: .750

3.) RECOMMENDED SPARE PARTS ARE:
4, 6

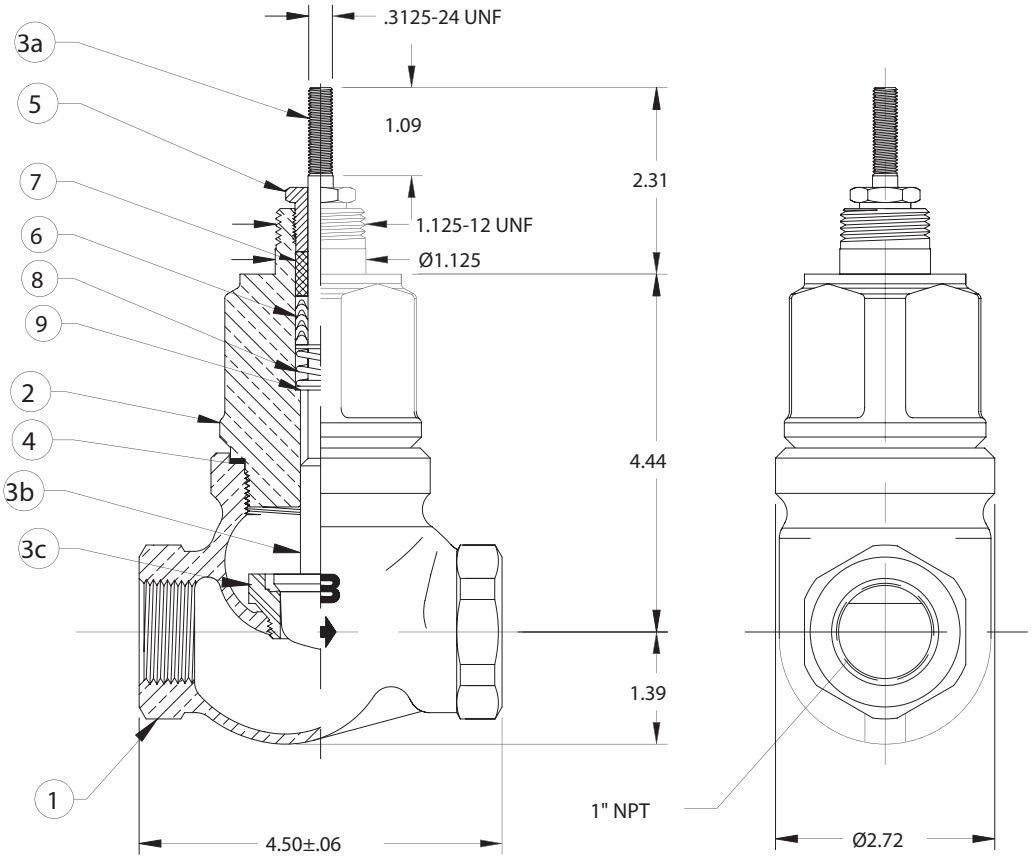
OPTIONAL SPARE PARTS ARE:
TRIM SET ITEMS 3, PACKING ITEMS 7, 8 & 9

4.) WHEN ORDERING SPARE OR REPLACEMENT PARTS, PROVIDE FACTORY THE VALVE ASSEMBLY SERIAL NUMBER FROM THE NAMEPLATE ON THE ACTUATOR.

PARTS & MATERIAL LIST

QUANTITIES ARE FOR ONE (1) UNIT ONLY

ITEM NO.	PART NO.	QTY	DESCRIPTION	MATERIAL
1	527192-0001	1	BODY	BRONZE, B62
2	527195-0001	1	BONNET	BRONZE, B62
3a	NOTE 1	1	STEM	316L SST
3b	NOTE 1	1	INNVERVALVE	316L SST
3c	NOTE 1	1	SEAT	316L SST
4	512895-0001	1	GASKET	COPPER
5	525950-0001	1	GLAND	316 SST
6	543242-0001	1	PACKING SET	TFE
7	527241-0001	1	FOLLOWER	PFA
8	510031-0158	1	SPRING	302 SST
9	430002-0115	2	WASHER	316 SST



CERTIFIED FOR:
P.O. :
LOCATION:
SERIAL NO.:
TAG NUMBER:
PREPARED BY: DATE:

APPROVALS	DATE
DRAWN: G. PRICE	11-07-95
CHECKED: W. HALL	06-23-00
ENGINEER: M.A. LOBO	10-30-00

BADGER METER
SERIES 9000 CONTROL VALVES
C

1" CAST GLOBE BODY,
STANDARD BONNET, CV RING PACKING,
MODEL 9103

SIZE	SCALE	DWG. NO.	ISSUE
A	1/2	CD-952006	01.03

DWG NO.	ISSUE	ISS	CHANGE	BY	DATE		
CD-952007	01.03	01.02	ECN 8882	GAP	09-05-96	UNLESS OTHERWISE SPECIFIED DIMENSIONS FOR REFERENCE ONLY LENGTH UNITS ARE INCHES	ALL PROPRIETARY RIGHTS IN THE SUBJECT MATTER SHOWN ON THIS DRAWING ARE THE EXCLUSIVE PROPERTY OF BADGER METER INCORPORATED.
		01.03	ECN 9160, EM 2001	DGD	06-21-00		

NOTES:

1.) TRIM ASSEMBLY P/N _____
Cv: ___ CHAR: ___

2.) NOMINAL STROKE: 1.00

3.) RECOMMENDED SPARE PARTS ARE:
4, 6

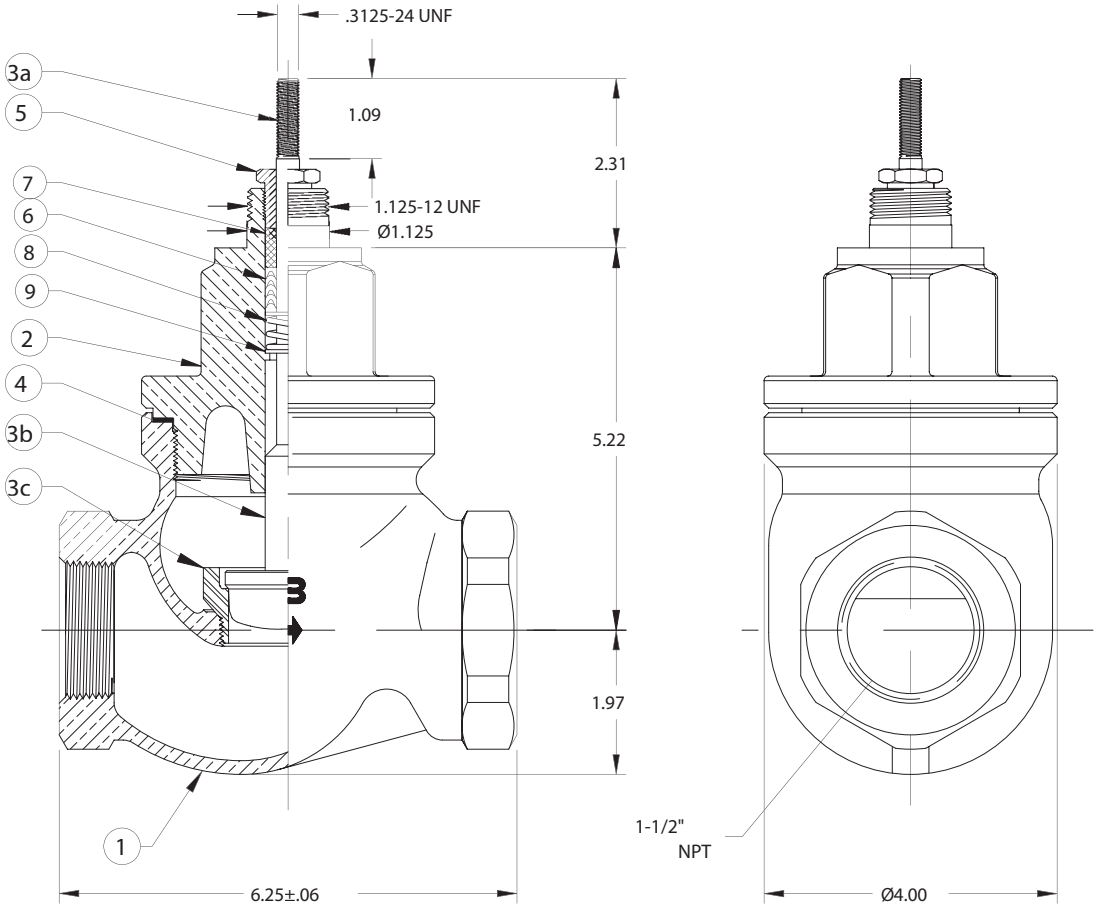
OPTIONAL SPARE PARTS ARE:
TRIM SET ITEMS 3, PACKING ITEMS 7, 8 & 9

4.) WHEN ORDERING SPARE OR REPLACEMENT PARTS, PROVIDE FACTORY THE VALVE ASSEMBLY SERIAL NUMBER FROM THE NAMEPLATE ON THE ACTUATOR.

PARTS & MATERIAL LIST

QUANTITIES ARE FOR ONE (1) UNIT ONLY

ITEM NO.	PART NO.	QTY	DESCRIPTION	MATERIAL
1	527191-0001	1	BODY	BRONZE, B62
2	527193-0001	1	BONNET	BRONZE, B62
3a	NOTE 1	1	STEM	316L SST
3b	NOTE 1	1	INNVERVALVE	316L SST
3c	NOTE 1	1	SEAT	316L SST
4	512893-0001	1	GASKET	COPPER
5	525950-0001	1	GLAND	316 SST
6	543242-0001	1	PACKING SET	TFE
7	527241-0001	1	FOLLOWER	PFA
8	510031-0158	1	SPRING	302 SST
9	430002-0115	2	WASHER	316 SST



CERTIFIED FOR:		APPROVALS	DATE	BADGER METER				
P.O. :		DRAWN: G. PRICE	11-09-95	SERIES 9000 CONTROL VALVES				C
LOCATION:		CHECKED: W. HALL	06-30-00	1-1/2" CAST GLOBE BODY, STANDARD BONNET, CV RING PACKING, MODEL 9105				
SERIAL NO.:		ENGINEER: M.A. LOBO	10-30-00	SIZE A	SCALE 7/16	DWG. NO. CD-952007	ISSUE 01.03	
TAG NUMBER:								
PREPARED BY:	DATE:							

DWG NO.	ISSUE	ISS	CHANGE	BY	DATE		
CD-952008	01.03	01.02	ECN 8882	GAP	09-05-96	UNLESS OTHERWISE SPECIFIED DIMENSIONS FOR REFERENCE ONLY LENGTH UNITS ARE INCHES	ALL PROPRIETARY RIGHTS IN THE SUBJECT MATTER SHOWN ON THIS DRAWING ARE THE EXCLUSIVE PROPERTY OF BADGER METER INCORPORATED.
		01.03	ECN 9160, EM 2001	DGD	06-21-00		

NOTES:

1.) TRIM ASSEMBLY P/N _____
Cv: ___ CHAR: _____

2.) NOMINAL STROKE: 1.00

3.) RECOMMENDED SPARE PARTS ARE:
4, 6

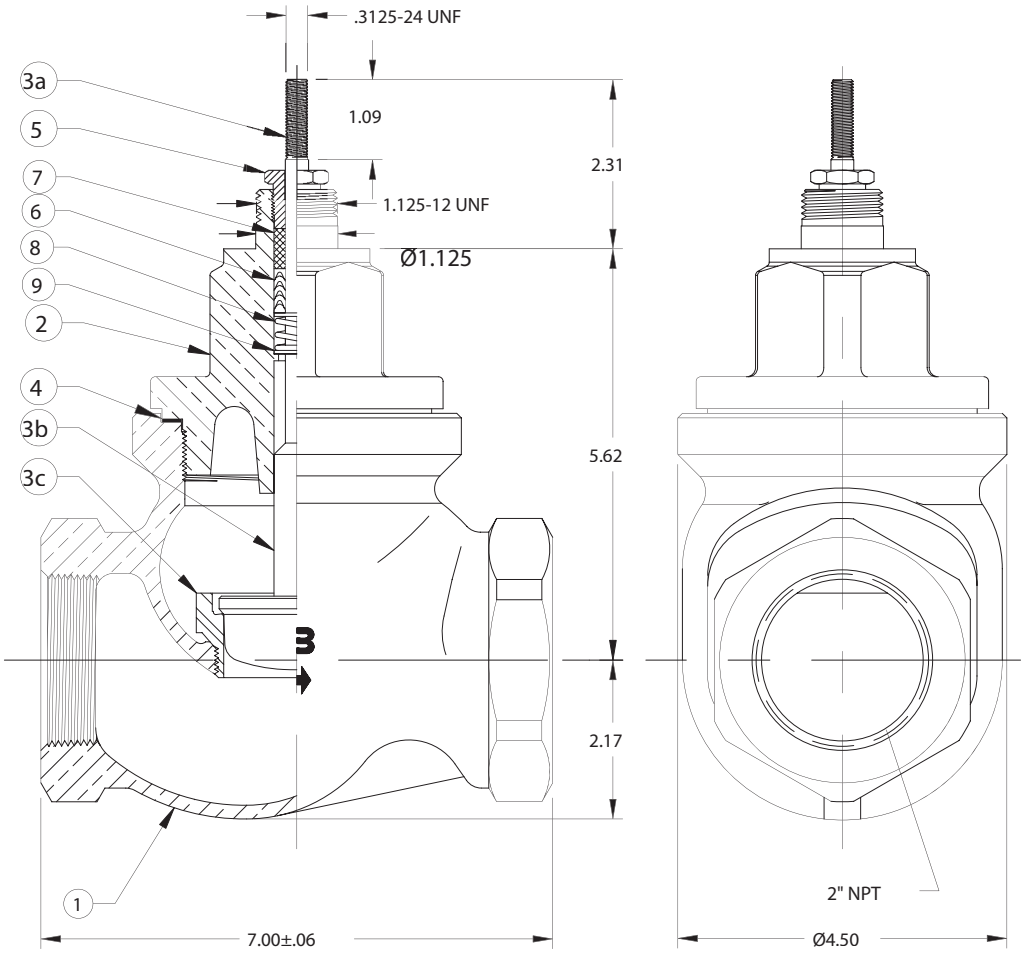
OPTIONAL SPARE PARTS ARE:
TRIM SET ITEMS 3, PACKING ITEMS 7, 8 & 9

4.) WHEN ORDERING SPARE OR REPLACEMENT PARTS, PROVIDE FACTORY THE VALVE ASSEMBLY SERIAL NUMBER FROM THE NAMEPLATE ON THE ACTUATOR.

PARTS & MATERIAL LIST

QUANTITIES ARE FOR ONE (1) UNIT ONLY

ITEM NO.	PART NO.	QTY	DESCRIPTION	MATERIAL
1	527190-0001	1	BODY	BRONZE, B62
2	527193-0001	1	BONNET	BRONZE, B62
3a	NOTE 1	1	STEM	316L SST
3b	NOTE 1	1	INNVERVALVE	316L SST
3c	NOTE 1	1	SEAT	316L SST
4	512893-0001	1	GASKET	COPPER
5	525950-0001	1	GLAND	316 SST
6	543242-0001	1	PACKING SET	TFE
7	527241-0001	1	FOLLOWER	PFA
8	510031-0158	1	SPRING	302 SST
9	430002-0115	2	WASHER	316 SST



CERTIFIED FOR: _____
P.O.: _____
LOCATION: _____
SERIAL NO.: _____
TAG NUMBER: _____
PREPARED BY: _____ DATE: _____

APPROVALS	DATE
DRAWN: G. PRICE	11-09-95
CHECKED: W. HALL	06-23-00
ENGINEER: M.A. LOBO	10-30-00

BADGER METER
SERIES 9000 CONTROL VALVES
C

2" CAST GLOBE BODY,
STANDARD BONNET, CV RING PACKING,
MODEL 9106

SIZE	SCALE	DWG. NO.	ISSUE
A	7/16	CD-952008	01.03

DWG NO.	ISSUE
CD-952009	01.05

ISS	CHANGE	BY	DATE
01.05	01.03	GAP	06-16-97
01.04	ECN 9217	GAP	06-23-98
01.05	CL III CD-H & TM	DGD	04-06-99

NOTES:

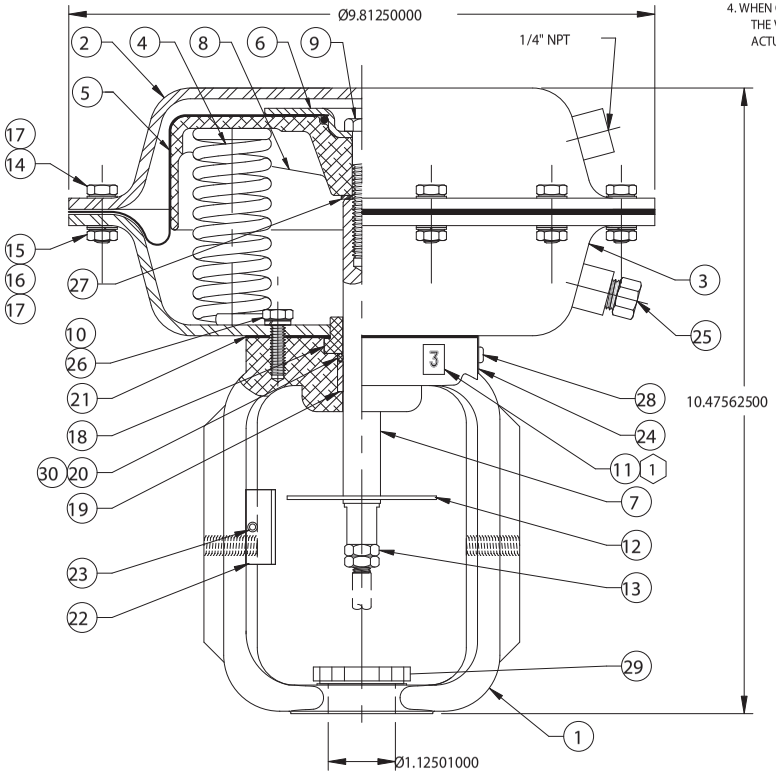
1. DENOTES QUANTITY OF SPRINGS IN UNIT AT TIME OF ORIGINAL FACTORY SHIPMENT. DOES NOT INDICATE RANGE OR TRAVEL.

2.

STROKE	TRAVEL SCALE	SPRINGS	OTHERS OPTIONAL)		
			SIGNAL(PSI)	QTY	PART NUMBER
.75	527233-0002	12 3	510031-0149		
1.00	527233-0001	12 3	510031-0157		

3. RECOMMENDED SPARE PARTS ARE ITEMS 5, 18, & 20.

4. WHEN ORDERING REPLACEMENT PARTS, PROVIDE FACTORY THE VALVE SERIAL NUMBER FROM THE NAMEPLATE ON THE ACTUATOR.



PARTS & MATERIAL LIST

QUANTITIES ARE FOR ONE (1) UNIT ONLY

ITEM NO.	PART NO.	QTY	DESCRIPTION	MATERIAL
1	527247-0001	1	YOKE	STL, EPOXY
2	526041-0001	1	SPRING CASE	STL, EPOXY
3	526042-0001	1	PRESSURE CASE	STL, EPOXY
4	NOTE 2		SPRING	17-7 PH SST
5	512698-0002	1	DIAPHRAGM	NITRILE/POLYESTER
6	512883-0001	1	RETAINER	STL, ZN PL
7	527315-0001	1	STEM	316 SST
8	512882-0001	1	PISTON	ALUM, ANODIZED
9	400013-0085	1	5/16 GR.8 SCR.	STL, ZN PL
10	430004-0014	6	WASHER, LOCK	SST
11	CONSULT FACTORY	1	DECAL, SPRG QTY	VINYL
12	512879-0002	1	TRAVEL POINTER	NYLON
13	410001-0058	2	STEM NUT	SST
14	400013-0002	12	RIM SCREW	SST
15	430004-0021	12	LK WASHER	SST
16	410001-0060	12	RIM NUT	SST
17	430002-0107	24	WASHER	SST
18	512880-0001	1	UPR BUSHING	NYLATRON
19	460019-0001	1	LWR BUSHING	POLYMER
20	490018-0003	1	O-RING	ELF NITRILE
21	512712-0001	1	YOKE GASKET	CARBON/NITRILE
22	NOTE 2	1	TRAVEL SCALE	ALUMINUM
23	400006-0056	1	SET SCREW	SST
24	512915-0001	1	NAMEPLATE	SST
25	526037-0001	1	VENT PLUG	PLASTIC
26	526119-0002	6	SCREW	STL, XYLAN COATED
27	527432-0001	1	WASHER, THRUST	STL, SILV PL
28	400001-0013	1	SCREW	SST
29	525944-0001	1	YOKE LOCKNUT	SST
30	500458-0025	-	GREASE	-

NYLATRON IS A TRADEMARK OF DSM ENGINEERING PLASTIC PRODUCTS, INC., POLYMER CORP. DIV.
XYLAN IS A TRADEMARK OF WHITFORD CORP.

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE FOR REFERENCE ONLY. LENGTH UNITS ARE INCHES.

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CERTIFIED FOR:
P.O. :
LOCATION:
SERIAL NO.:
TAG NUMBER:
PREPARED BY: DATE:

APPROVALS	DATE
DRAWN: W. HALL	06-05-96
CHECKED: W. HALL	04-29-99
ENGINEER: M.A. LOBO	04-29-99

BADGER METER
SERIES 9000 CONTROL VALVES
C

ACTUATOR, 35 SQ. IN. ATC,
MODEL 9100

SIZE	SCALE	DWG. NO.	ISSUE
A	3/8	CD-952009	01.05

DWG NO.	ISSUE
CD-952010	01.05

ISS	CHANGE	BY	DATE
01.03	ECN 9085	GAP	06-16-97
01.04	ECN 9217	GAP	06-23-98
01.05	CL III CD-H	DGD	04-06-99

NOTES:

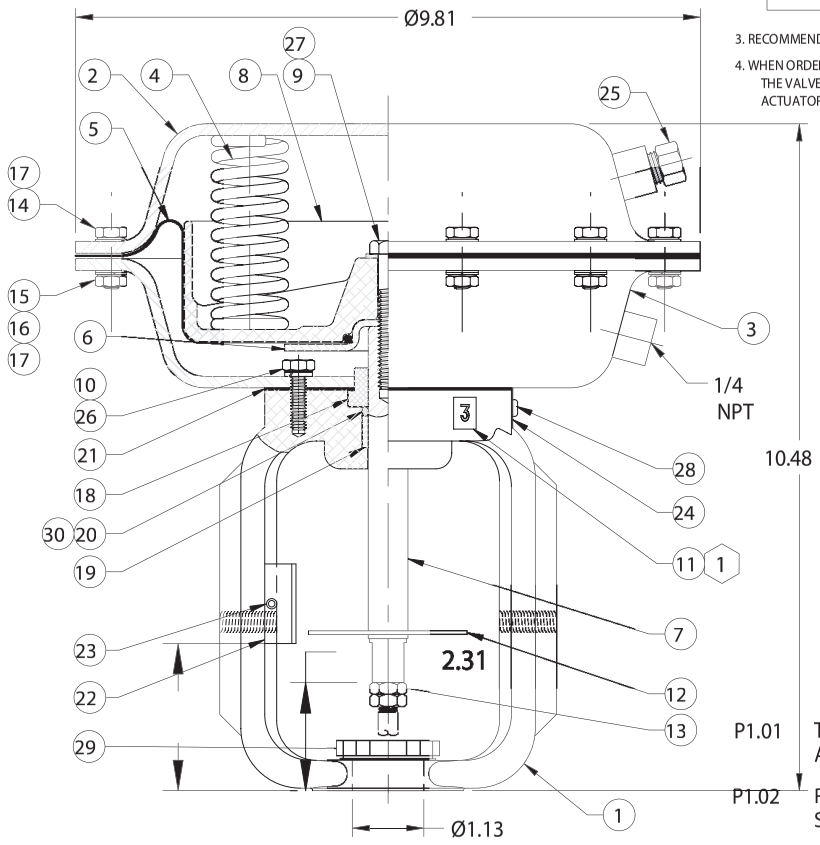
1. (1) DENOTES QUANTITY OF SPRINGS IN UNIT AT TIME OF ORIGINAL FACTORY SHIPMENT. DOES NOT INDICATE RANGE OR TRAVEL.

2.

STROKE	TRAVEL SCALE	SPRINGS (OTHERS OPTIONAL) SIGNAL(PSI)	QTY	PART NUMBER
.75	527233-0002	12 3	510031-0149	
1.00	527233-0001	12 3	510031-0162	

3. RECOMMENDED SPARE PARTS ARE ITEMS 5, 18, & 20.

4. WHEN ORDERING REPLACEMENT PARTS, PROVIDE FACTORY THE VALVE SERIAL NUMBER FROM THE NAMEPLATE ON THE ACTUATOR.



NYLATRON IS A TRADEMARK OF DSM ENGINEERING PLASTIC PRODUCTS, INC., POLYMER CORP. DIV.

XYLAN IS A TRADEMARK OF WHITFORD CORP.

P1.01	THIS PRE-PRODUCTION ISSUE FOR ASSEMBLY ONLY	01-31-96	GAP
P1.02	REMOVE SEALING WASHER, & SPRING NUMBER STICKER, ADD SECOND JAM NUT, STEM FLATS	5-16-96	TWH

PARTS & MATERIAL LIST

QUANTITIES ARE FOR ONE (1) UNIT ONLY

ITEM NO.	PART NO.	QTY	DESCRIPTION	MATERIAL
1	527247-0001	1	YOKE	STL, EPOXY
2	526041-0001	1	SPRING CASE	STL, EPOXY
3	526042-0001	1	PRESSURE CASE	STL, EPOXY
4	NOTE 2		SPRING	17-7 PH SST
5	512698-0002	1	DIAPHRAGM	NITRILE
6	512883-0001	1	RETAINER	STL, ZN PL
7	527315-0001	1	STEM	316 SST
8	512882-0001	1	PISTON	ALUM, ANODIZED
9	400013-0085	1	5/16 GR.8 SCR.	STL, ZN PL
10	430004-0014	6	WASHER, LOCK	SST
11	CONSULT FACTORY	1	DECAL, SPRG QTY	VINYL
12	512879-0002	1	TRAVEL POINTER	NYLON
13	410001-0058	2	STEM NUT	SST
14	400013-0002	12	RIM SCREW	SST
15	430004-0021	12	LK WASHER	SST
16	410001-0060	12	RIM NUT	SST
17	430002-0107	24	WASHER	SST
18	512880-0001	1	UPR BUSHING	NYLATRON
19	460019-0001	1	LWR BUSHING	POLYMER
20	490018-0003	1	O-RING	ELF NITRILE
21	512712-0001	1	YOKE GASKET	CARBON/NITRILE
22	NOTE 2	1	TRAVEL SCALE	ALUMINUM
23	400006-0056	1	SET SCREW	SST
24	512915-0001	1	NAMEPLATE	SST
25	526037-0001	1	VENT PLUG	PLASTIC
26	526119-0002	6	SCREW	
27	527432-0001	1	WASHER, THRUST	STL, SILV PL
28	400001-0013	2	SCREW	SST
29	525944-0001	1	YOKE LOCKNUT	SST
30	500458-0025	-	GREASE	-

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE FOR REFERENCE ONLY. LENGTH UNITS ARE INCHES.

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CERTIFIED FOR:

P.O. :

LOCATION:

SERIAL NO.:

TAG NUMBER:

PREPARED BY: DATE:

APPROVALS	DATE
DRAWN: G. PRICE	11-13-95
CHECKED: W. HALL	04-29-99
ENGINEER: M.A. LOBO	04-29-99

BADGER METER
SERIES 9000 CONTROL VALVES

C

ACTUATOR, 35 SQ. IN. ATO, MODEL 9100

SIZE	SCALE	DWG. NO.	ISSUE
A	3/8	CD-952010	01.05

DWG NO.	ISSUE	ISS	CHANGE	BY	DATE		
CD-952035	01.03	01.02	8882	GAP	09-05-96	UNLESS OTHERWISE SPECIFIED DIMENSIONS FOR REFERENCE ONLY LENGTH UNITS ARE INCHES	ALL PROPRIETARY RIGHTS IN THE SUBJECT MATTER SHOWN ON THIS DRAWING ARE THE EXCLUSIVE PROPERTY OF BADGER METER INCORPORATED.
		01.03	ECN 9160, EM 2001	DGD	06-21-00		

NOTES:

1.) TRIM ASSEMBLY P/N _____
Cv: ___ CHAR: ___ _____

2.) NOMINAL STROKE: .750

3.) RECOMMENDED SPARE PARTS ARE:
4, 6

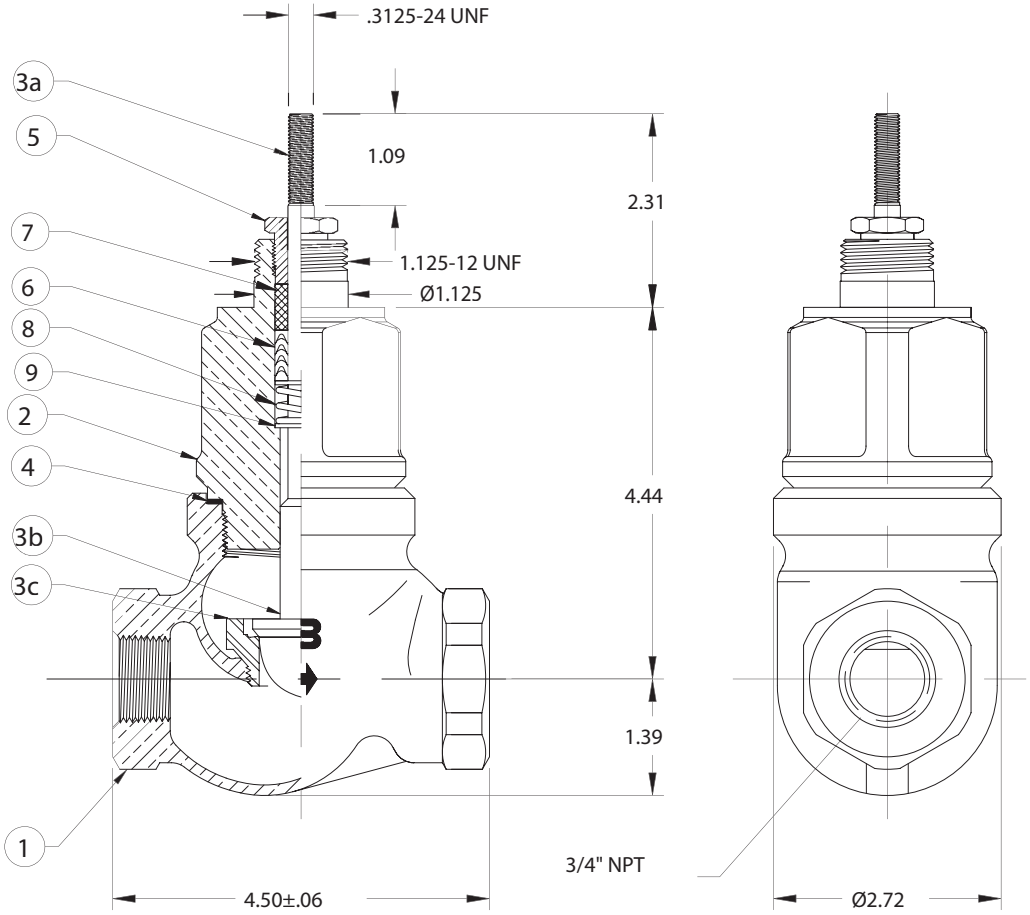
OPTIONAL SPARE PARTS ARE:
TRIM SET ITEMS 3, PACKING ITEMS 7, 8 & 9

4.) WHEN ORDERING SPARE OR REPLACEMENT PARTS, PROVIDE FACTORY THE VALVE ASSEMBLY SERIAL NUMBER FROM THE NAMEPLATE ON THE ACTUATOR.

PARTS & MATERIAL LIST

QUANTITIES ARE FOR ONE (1) UNIT ONLY

ITEM NO.	PART NO.	QTY	DESCRIPTION	MATERIAL
1	527304-0001	1	BODY	BRONZE, B62
2	527195-0001	1	BONNET	BRONZE, B62
3a	NOTE 1	1	STEM	316L SST
3b	NOTE 1	1	INNVERVALVE	316L SST
3c	NOTE 1	1	SEAT	316L SST
4	512895-0001	1	GASKET	COPPER
5	525950-0001	1	GLAND	316 SST
6	543242-0001	1	PACKING SET	TFE
7	527241-0001	1	FOLLOWER	PFA
8	510031-0158	1	SPRING	302 SST
9	430002-0115	2	WASHER	316 SST



CERTIFIED FOR:		APPROVALS	DATE	BADGER METER	C
P.O. :		DRAWN: G. PRICE	11-07-95	SERIES 9000 CONTROL VALVES	
LOCATION:		CHECKED: W. HALL	06-23-00	**3/4" CAST** GLOBE BODY, STANDARD BONNET, CV RING PACKING, MODEL 9102	
SERIAL NO.:		ENGINEER: M.A. LOBO	10-30-00	SIZE A / SCALE 1/2 / DWG. NO. CD-952035 / ISSUE 01.03	
TAG NUMBER:					
PREPARED BY:	DATE:				

DWG NO.	ISSUE	ISS	CHANGE	BY	DATE		
CD-952036	01.03	01.02	ECN 8882	GAP	09-05-96	UNLESS OTHERWISE SPECIFIED DIMENSIONS FOR REFERENCE ONLY LENGTH UNITS ARE INCHES	ALL PROPRIETARY RIGHTS IN THE SUBJECT MATTER SHOWN ON THIS DRAWING ARE THE EXCLUSIVE PROPERTY OF BADGER METER INCORPORATED.
		01.03	ECN 9160, EM 2001	DGD	06-20-00		

NOTES:

1.) TRIM ASSEMBLY P/N _____
Cv: ___ CHAR: _____

2.) NOMINAL STROKE: 1.00

3.) RECOMMENDED SPARE PARTS ARE:
4, 6

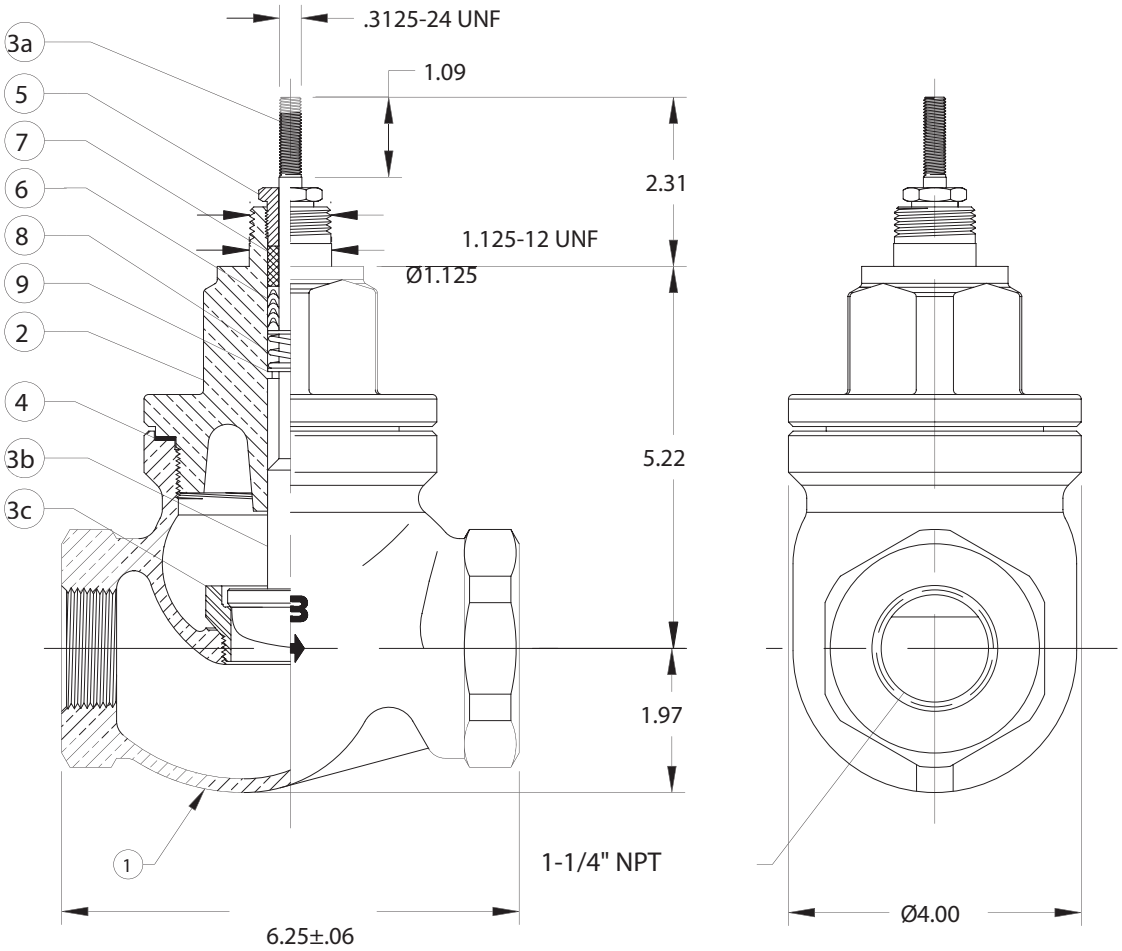
OPTIONAL SPARE PARTS ARE:
TRIM SET ITEMS 3 , PACKING ITEMS 7, 8 & 9

4.) WHEN ORDERING SPARE OR REPLACEMENT PARTS, PROVIDE FACTORY THE VALVE ASSEMBLY SERIAL NUMBER FROM THE NAMEPLATE ON THE ACTUATOR.

PARTS & MATERIAL LIST

QUANTITIES ARE FOR ONE (1) UNIT ONLY

ITEM NO.	PART NO.	QTY	DESCRIPTION	MATERIAL
1	527305-0001	1	BODY	BRONZE, B62
2	527193-0001	1	BONNET	BRONZE, B62
3a	NOTE 1	1	STEM	316L SST
3b	NOTE 1	1	INNVERVALVE	316L SST
3c	NOTE 1	1	SEAT	316L SST
4	512893-0001	1	GASKET	COPPER
5	525950-0001	1	GLAND	316 SST
6	543242-0001	1	PACKING SET	TFE
7	527241-0001	1	FOLLOWER	PFA
8	510031-0158	1	SPRING	302 SST
9	430002-0115	2	WASHER	316 SST



CERTIFIED FOR:		APPROVALS	DATE	BADGER METER SERIES 9000 CONTROL VALVES				C
P.O. :		DRAWN: G. PRICE	11-09-95	1-1/4" CAST GLOBE BODY, STANDARD BONNET, CV RING PACKING, MODEL 9104				
LOCATION:		CHECKED: W. HALL	07-14-00					
SERIAL NO.:		ENGINEER: M.A LOBO	10-31-00	SIZE A	SCALE 7/16	DWG. NO. CD-952036	ISSUE 01.03	
TAG NUMBER:								
PREPARED BY:	DATE:							

DWG NO.	ISSUE	ISS	CHANGE	BY	DATE	UNLESS OTHERWISE SPECIFIED	ALL PROPRIETARY RIGHTS IN THE SUBJECT MATTER
CD-952482	01.01	01.01	ECN 9160, EM 2001	DGD	06-20-00	DIMENSIONS FOR REFERENCE ONLY LENGTH UNITS ARE INCHES	SHOWN ON THIS DRAWING ARE THE EXCLUSIVE PROPERTY OF BADGER METER INCORPORATED.

NOTES:

1.) TRIM ASSEMBLY P/N _____
Cv: ___ CHAR: ___

2.) NOMINAL STROKE: .750

3.) RECOMMENDED SPARE PARTS ARE:
4, 6

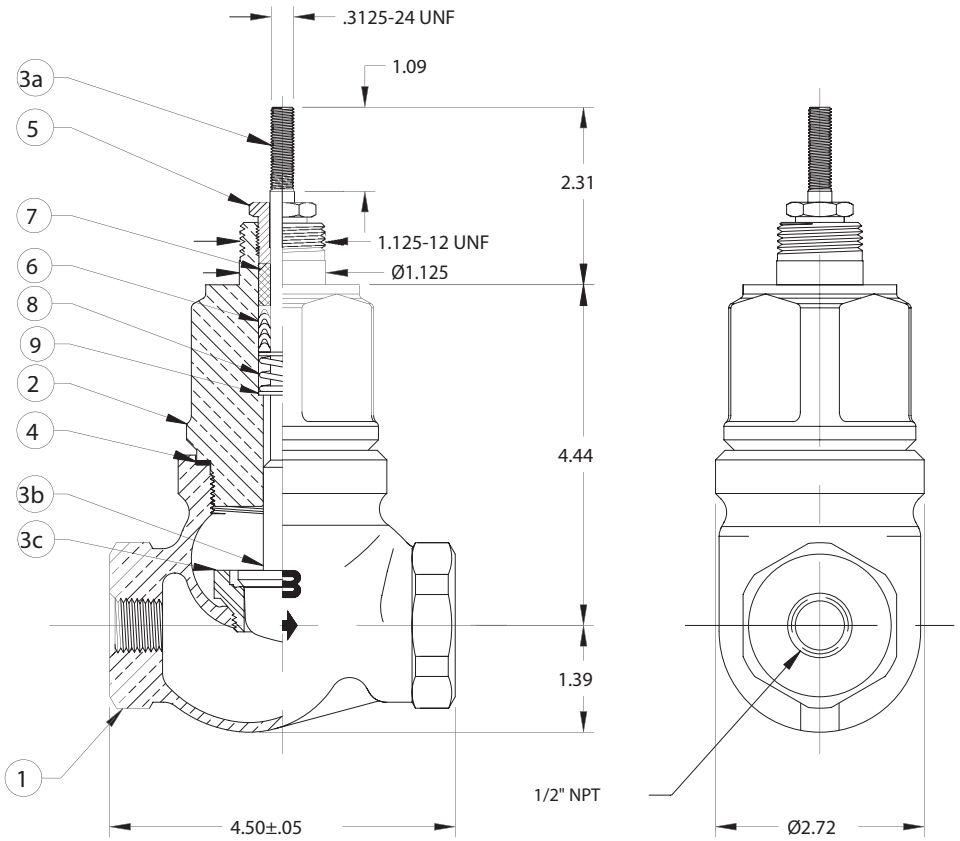
OPTIONAL SPARE PARTS ARE:
TRIM SET ITEMS 3, PACKING ITEMS 7, 8 & 9

4.) WHEN ORDERING SPARE OR REPLACEMENT PARTS, PROVIDE FACTORY THE VALVE ASSEMBLY SERIAL NUMBER FROM THE NAMEPLATE ON THE ACTUATOR.

PARTS & MATERIAL LIST

QUANTITIES ARE FOR ONE (1) UNIT ONLY

ITEM NO.	PART NO.	QTY	DESCRIPTION	MATERIAL
1	527759-0001	1	BODY	BRONZE, B62
2	527195-0001	1	BONNET	BRONZE, B62
3a	NOTE 1	1	STEM	316L SST
3b	NOTE 1	1	INNVERVALVE	316L SST
3c	NOTE 1	1	SEAT	316L SST
4	512895-0001	1	GASKET	COPPER
5	525950-0001	1	GLAND	316 SST
6	543242-0001	1	PACKING SET	TFE
7	527241-0001	1	FOLLOWER	PFA
8	510031-0158	1	SPRING	302 SST
9	430002-0115	2	WASHER	316 SST



CERTIFIED FOR:	APPROVALS	DATE	BADGER METER SERIES 9000 CONTROL VALVES			C
P.O.:	DRAWN: G. PRICE	05-27-98	**1/2" CAST** GLOBE BODY, STANDARD BONNET, CV RING PACKING, MODEL 9101			
LOCATION:	CHECKED: W. HALL	07-14-00				
SERIAL NO.:	ENGINEER: M.A. LOBO	10-30-00	SIZE: A	SCALE: 1/2	DWG. NO.: CD-952482	ISSUE: 01.01
TAG NUMBER:						
PREPARED BY: DATE:						

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The Americas | Badger Meter | 4545 West Brown Deer Rd | PO Box 245036 | Milwaukee, WI 53224-9536 | 800-876-3837 | 414-355-0400
México | Badger Meter de las Americas, S.A. de C.V. | Pedro Luis Ogazón N°32 | Esq. Angelina N°24 | Colonia Guadalupe Inn | CP 01050 | México, DF | México | +52-55-5662-0882
Europe, Middle East and Africa | Badger Meter Europa GmbH | Nurtinger Str 76 | 72639 Neuffen | Germany | +49-7025-9208-0
Europe, Middle East Branch Office | Badger Meter Europe | PO Box 341442 | Dubai Silicon Oasis, Head Quarter Building, Wing C, Office #C209 | Dubai / UAE | +971-4-371 2503
Czech Republic | Badger Meter Czech Republic s.r.o. | Mařikova 2082/26 | 621 00 Brno, Czech Republic | +420-5-41420411
Slovakia | Badger Meter Slovakia s.r.o. | Racianska 109/B | 831 02 Bratislava, Slovakia | +421-2-44 63 83 01
Asia Pacific | Badger Meter | 80 Marine Parade Rd | 21-06 Parkway Parade | Singapore 449269 | +65-63464836
China | Badger Meter | 7-1202 | 99 Hangzhong Road | Minhang District | Shanghai | China 201101 | +86-21-5763 5412

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